SERVICE MANUAL

MULTIQUIP ®

MTX SERIES RAMMERS

TOOLS ○ DISASSEMBLY DIAGRAMS ○ TROUBLESHOOTING

Manual No. MTX2015SM

CALIFORNIA

Proposition 65 Warning:

Engine exhaust and some of its constituents, and some dust created by power sanding, sawing, grinding, drilling and other construction activities contains chemicals known to the State of California to cause cancer, birth defects and other reproductive harm.

Some examples of these chemicals are:

- Lead and lead-based paint.
- Crystalline silica from bricks.
- Cement and other masonry products.
- Arsenic and chromium from chemically treated lumber.

Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: ALWAYS work in a well ventilated area, and work with approved safety equipment, such as dust mask that are specially designed to filter out microscopic particles.

MTX TAMPING RAMMER SERVICE MANUAL
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1. PREFACE

- Please read an instruction manual of a separate volume before work by all means in order to get security of work when I do right driving, maintenance of TAMPING RAMMER and preparation.
- On the handling of an engine, please read an engine instruction manual and a preparation manual of a separate volume.
- This preparation commentary handwriting mentions the point of the resolution / assembling in preparation of TAMPING RAMMER and a preparation standard.You read this preparation commentary handwriting carefully before getting it ready, and please understand enough structure / a function of each part.
- For inquiries about repair parts, parts lists, service manuals, and repair of the machine, please contact Multiquip dealer in your area. In addition, parts lists are available on the MQ Service & Support Center website at: http://service.multiquip.com

2. WARNING LABELS

The triangle shaped marks used in this manual and on the decals stuck on the main body indicate common hazards. Be sure to read and observe the cautions described.

⚠ Warning labels indicating hazards to humans and to equipment.

⚠ **DANGER:** Denotes an extreme hazard. It calls attention to a procedure,practice, condition or the like, which, if not correctly performedor adhered to, is likely to result in serious injury or death.

⚠ **WARNING:** Denotes a hazard. It calls attention to a procedure, practice,condition or the like, which, if not correctly performed or adhered to, could result in serious injury or death.

⚠ **CAUTION:** Denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury to people and may damage or destroy the product.

Precautions (without a triangular mark): Failure to follow the instructions may result in damage to property.

3. PRECAUTIONS FOR SAFETY

3.1 Work area

⚠ **DANGER**

- Do not work in a poorly ventilated area such as indoors or inside a tunnel. Exhaust from engines contains toxic substances such as carbon monoxide, and it is very dangerous if those oisonous gases and dust are inhaled. Also to maintain better ventilation, keep an appropriate distance from buildings when operating this machine.

⚠ **CAUTION**

- Do maintenance work in a place with a flat robust surface to keep the machine stable while being maintained. Also select an area with sufficient space for maintenance work.
- Before maintenance work, clean the floor thoroughly. Oil and other soiling left on the floor may cause accidental fall.
  For maintenance work, make sure the work area is well lighted.
- A portable lamp to illuminate the work site has to be protected by wire.
  If the lamp breaks, fuel and oil might ignite.
- To prepare for emergency, the work area should be equipped with emergency medical devices and fire extinguishers.

3.2 Clothing and protective gear

⚠ DANGER

- To make the work safe, wear work clothes that fit properly, and use protective gear such as a helmet and safety boots appropriate for the work.
  Work clothes that do not fit might be caught in the rotating parts, leading to an unexpected injury.

3.3 Cautions during refueling

⚠ CAUTION

- When refueling, pay attention to the following points.
  - Always refuel in a well ventilated area.
    Make sure that the engine is stopped. Refuel after the engine cools down.
  - Refuel on a flat surface area with no flammable objects around.
    Be careful not to spill the fuel. If a spill occurs, wipe it well.
  - Keep away from open fires while refueling.
    (Smoking is strictly prohibited while refueling.)

- Spills might occur if the fuel is filled to the top. After refueling, tightly close the tank cap by twisting it to the end.

3.4 Preventing burns and accidentally being caught in the machine

⚠ WARNING

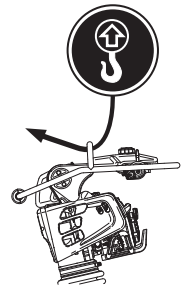
- Start your work only after the machine cools down completely.
  The muffler, in particular, gets very hot, and an accidental burn might occur.
  The engine and engine oil also get very hot, so be careful not to get a burn.

- If you perform maintenance work with the engine running, you might be accidentally caught in the rotating parts such as the clutch and gear.
  Perform maintenance work after the engine is stopped.

3.5 Tools and equipment, etc

⚠ WARNING

- Qualification is required for handling the crane. Only someone qualified to operate a crane and do hooking work can handle the crane.
- Before operating the crane, for safety reasons, check the machine parts (especially the hook and anti-vibration rubber) for any damage and loosened or missing bolts.
- Stop the engine while hoisting.
- Use a sufficiently strong wire rope.
- For safety reasons, do not hoist to a height that is highter than necessary.
- Do not use a wire rope if it is damaged.
- For hoisting, use only the one point hoisting hook, and do not hoist at other parts (such as the handle).



- When using a hydraulic shovel as a crane, never hoist up and down suddenly.
- When the machine is hoisted, never allow people or animals underneath the crane.
- For safety reasons, do not hoist to a height that is higher than necessary.
  Be careful not to cause accidents while operating the hoisting equipment.
  Also make sure the hoisting equipment is not malfunctioning.
- Use appropriate tools. Using tools that do not fit the parts will not only damage the parts but also cause unexpected injury.

3.6 Use of genuine parts and genuine oils

⚠ CAUTION

- Always use genuine parts and oils. The use of inappropriate parts will greatly shorten the life of the machine, also resulting in unexpected accidents.

3.7 Tightening torque of bolts and nuts

⚠ WARNING

- For tightening of bolts and nuts, use the tightening torque specified in this maintenance manual. Over-tightening and the lack of torque will not only shorten the life of the machine but also result in unexpected accidents such as breakage and break-down of the machine while in use.

3.8 Handling of wastes

⚠ CAUTION

- Store waste engine oil, lubrication oil and fuel in a container. Never release such wastes on the ground or discharge them in side ditches. Handle them in compliance with the applicable laws and other regulations.

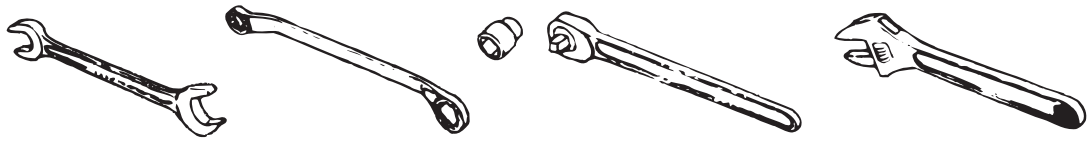
  her than necessary.
  Be careful not to cause accidents while operating the hoisting equipment.
  Also make sure the hoisting equipment is not malfunctioning.

  Use appropriate tools. Using tools that do not fit the parts will not only damage the parts but also cause unexpected injury.

4. TOOL

1. Wrench 6mm 8mm 10mm 12mm 13mm 14mm 17mm 19mm

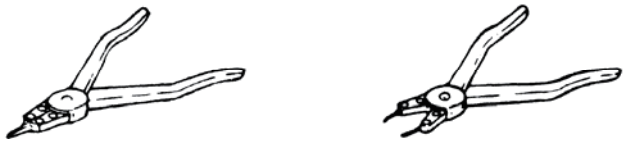
   Offset wrench/Socket wrench/Adjustable wrench



2. Hexagonal wrench / Hexagonal socket

   5mm 6mm

3. External snap ring plier/Internal snap ring plier(bent type can be also used)



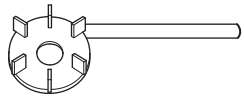
4. Screwdriver, flat and cross

5. Metal and plastic hammers

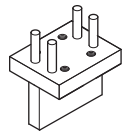
6. Sealing compound (Locktite 221 and 242)

7. Molybdenum grease
8. Grease for combination lever C1-Z (P/N:9800-10420)
10. Pressing machine
11. Special tool

Clutch puller “A”
(P/N:9810-10400)

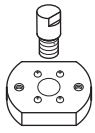


Clutch mounter
(P/N:9830-10060)

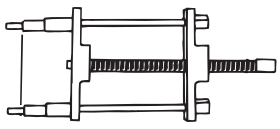


Piston rod holder
(P/N:9839-10090)

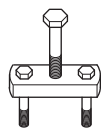
Socket head bolt 8X50
(Crank gear remover)
(P/N:0091-10044)



Clutch puller “B”
(P/N:9839-10020)



Spring cylinder remover
(P/N:9830-10040)



Piston end remover
(P/N:9839-10010)

5. INSPECTION PROCEDURE

5.1 External appearance check

(1) Installation of parts (loosened screw, defective parts, etc.)

(2) Damage on machine

(3) Oil check (level and contamination)

A. Engine oil (SAE10W-30 when shipped) (See operation manual for the engine)

B. Main body oil (SAE10W-30 when shipped) (See table 1)

(4) Shock rubber for damage, crack, fatigue, hardening, etc.

5.2 Operating test

(1) Check for engine speed. (Idling and Operating speed)

(2) Check for abnormal noise and jump during operation.

6. ENGINE AND OIL

Table 1

Model		MTX-60	MTX-70	MTX-80	MTX-90
Engine type		Honda GX100U-KRBF		Robin EH12-2D46530	
Idling engine speed	rpm	1900 - 2000	1900 - 2000	1900 - 2000	1900 - 2000
Setting speed	rpm	3800 - 4100	3800 - 4100	3400 - 3600	3500 - 3700
Fuel tank capaity	liters (quart)	2 (2.1)	3 (3.2)		
Lubricant for Body		Automobile Oil SAE 10W-30; Class SE or higher			
Capacity of Lubricant for Body	liters (quart)	0.65 (0.69)		0.82 (0.87)	
Lubricant for Engine		Automobile Oil SAE 10W-30; Class SE or higher			
Capacity of Lubricant for Engine	liters (quart)	0.28 (0.30)		0.4 (0.42)	
Fuel		Unleaded Gasoline			

7. RULES FOR CONDUCTING SERVICE WORK

(1) Before removing or disassembly any parts or component, be sure to know exactly how it was installed or assembled.
(2) Disassembly work should be conducted working space where it is free from dust.
(3) Protect the parts or component with sheet to avoid smearing or damaging during service work.
(4) Use proper tools and genuine parts in proper manner.
(5) Level check or replacement of oil for main body and engine should be carried out on level ground.
(6) Replace the disassembled O-ring, oil seal, packing, gasket or the like with new one.
(7) Do not reuse any bolts which it has been heated for disassembly.
(8) Use the specified standard tightening torque (See Table 2) and bonding agent (Loctite#221 and #242 or the like) when tightening the bolts and nuts.
And clean the bolts and nuts before tightening them or coating with bonding agent to them.

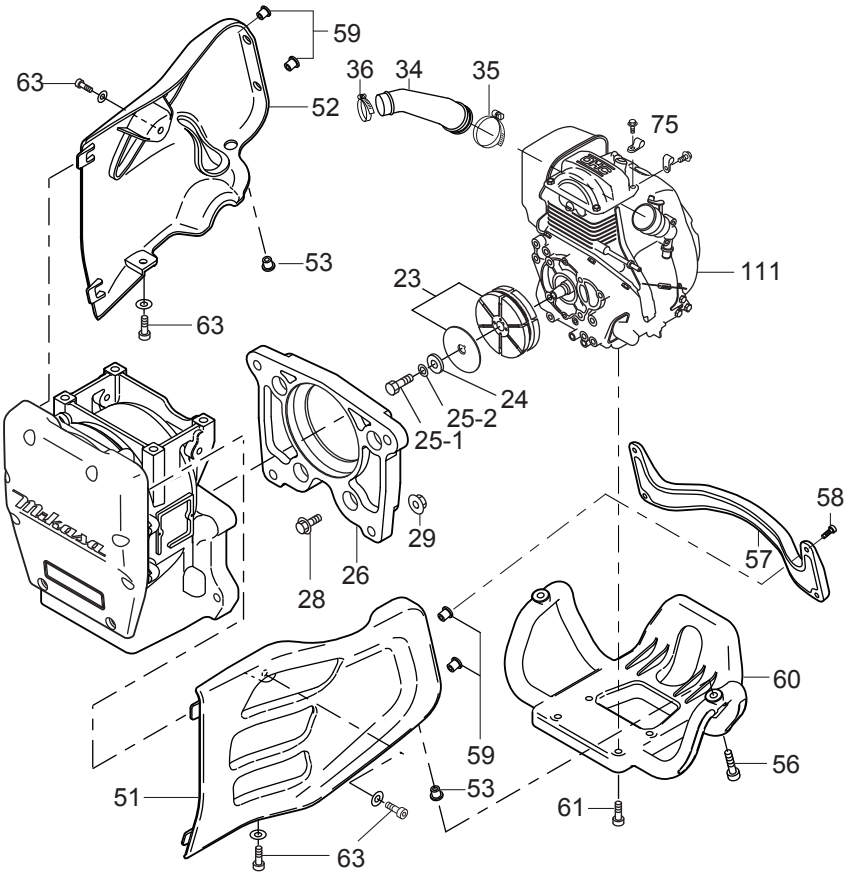
Standard torque table — Table 2

Screw diameter		The caller screws materials	
		Aluminum type	SS,FCD, Aluminum type+Helisert
M6	N·m	11.8 - 14.7	14.7 - 17.7
	Kgf·cm	120 - 150	150 - 180
	ft·lbf	8.7 - 10.8	10.8 - 13.0
M8	N·m	24.5 - 29.4	32.4 - 35.3
	Kgf·cm	250 - 300	330 - 360
	ft·lbf	18.1 - 21.7	23.9 - 26.0
M10	N·m	58.8 - 68.6	73.5 - 78.5
	Kgf·cm	600 - 700	750 - 800
	ft·lbf	43.4 - 50.6	54.2 - 57.9
M12	N·m	98.1 - 107.9	112.8 - 122.6
	Kgf·cm	1000 - 1100	1150 - 1250
	ft·lbf	72.3 - 79.6	83.2 - 90.4
M14	N·m	117.7 - 127.5	166.7 - 176.5
	Kgf·cm	1200 - 1300	1700 - 1800
	ft·lbf	86.8 - 94.4	123.0 - 130.2

8. DISASSEMBLY AND REASSEMBLY

8.1 Disassembly and reassembly the Engine

MTX-60
MTX-70
(Figure is MTX−70)



MTX-80
MTX-90

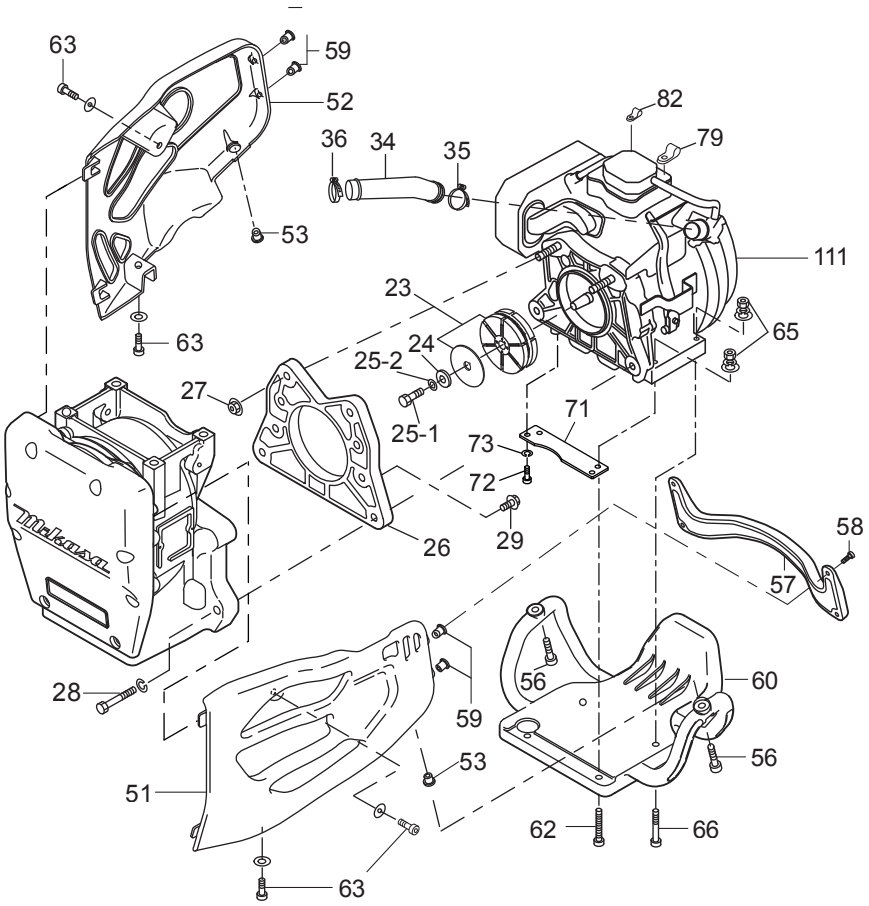


fig.1

(1) Disassembly

A. Remove the EX bar (57) by unscrewing 4 pcs bolts (58).

B. Remove the muffler guard (52) and the link guard (51) by unscrewing 4 pcs bolts (63) and 2 pcs bolts (56).

No.	Size	Tightening torque	Remarks
63	Socket Head Bolt M8X20, PW	19.6N·m (14.5ft·lbf)	Apply Loctite #221

C. Remove the engine guard (60) as per following terms

i) In case of MTX-60 / 70

Remove the engine guard (60) by unscrewing 4 pcs bolts (61).

No.	Size	Tightening torque	Remarks
61	Socket Head Bolt M8X30	17.6N·m (13.0ft·lbf)	Apply Loctite #221

ii) In case of MTX-80 / 90

Remove the engine guard (60) by unscrewing 4 pcs nuts (65) and 2 pcs bolts (72).

No.	Size	Tightening torque	Remarks
65	Nut M8	19.6N·m (14.5ft·lbf)	Apply Loctite #221
72	Socket Head Bolt M8X20	19.6N·m (14.5ft·lbf)	

D. Disconnect the fuel hose from the carburetor side. Disconnect the wire harness of combination lever and the curl cord of hour & tachometer from the engine. (fig.2)

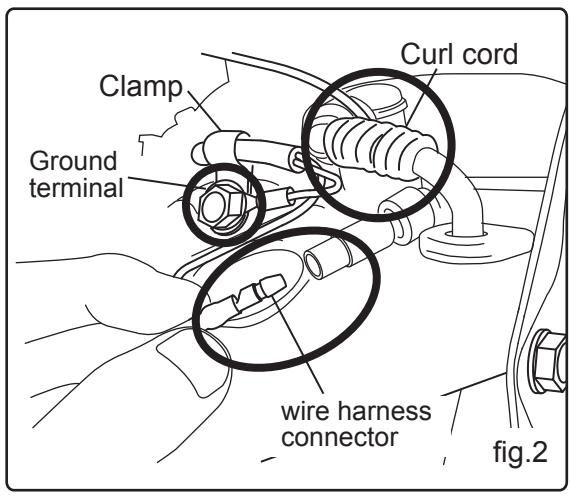


fig.2

E. Remove the speed control wire by loosening a pan head screw and 2 pcs M6 nuts. (fig.3)

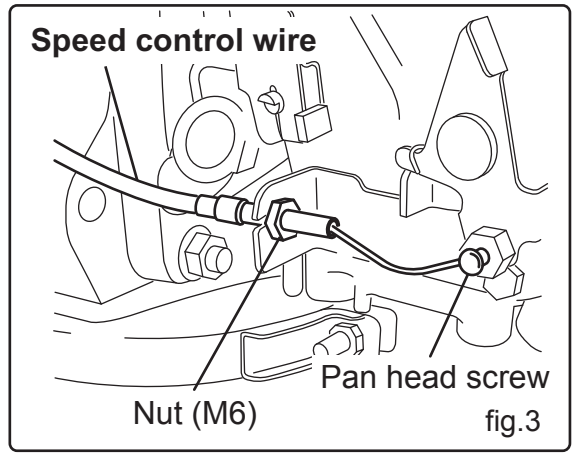


fig.3

F. Remove the intake pipe (34) by loosening a flat screw of cyclone clamp (35).

G. Remove the engine as per following terms.

i) In case of MTX-60 / 70

(1) Unscrew 4 pce nuts (29) and remove the engine from the crankcase slowly by having it firmly with both of hands.

No.	Size	Tightening torque	Remarks
29	Flange Nut M10	53.9N·m (39.8ft·lbf)	

(2) Remove the engine flange(26) by unscrewing 4 pcs flange bolts (28).

No.	Size	Tightening torque	Remarks
28	Flange Bolt M10X40	22.5N·m (16.6ft·lbf)	MTX-60
	Flange Bolt M10X30		MTX-70

ii) In case of MTX-80 / 90

(1) Unscrew 2 pcs flange nuts (27) and 2 pcs bolts (28), and remove the engine from the crankcase slowly by having it firmly with both of hands.

No.	Size	Tightening torque	Remarks
27	Flange Nut M10	53.9N·m (39.8ft·lbf)	
28	Bolt M10X70	53.9N·m (39.8ft·lbf)	

(2) Remove the engine flange (26) from the crank case by unscrewing 4 pcs flange bolts (29).

No.	Size	Tightening torque	Remarks
29	Flange Bolt M8X30	19.6N·m (14.5ft·lbf)	

H. Unscrew a bolt (25) which is fixing the clutch. Then, assemble the clutch puller B (P/N:9839 -10020) to the clutch by tightening 4 pcs pan head screws, and tighten the center bolt B to the crank shaft of engine. (fig.4)

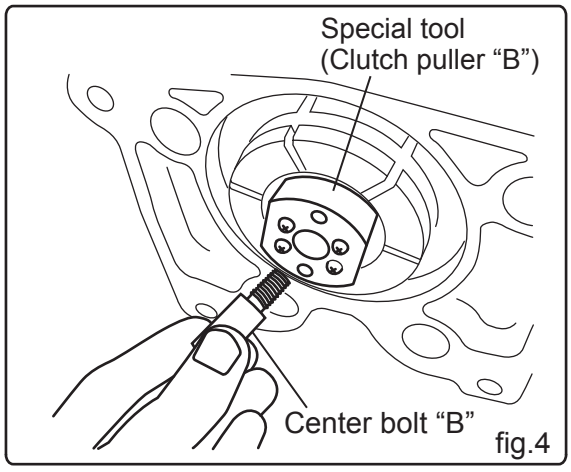


fig.4

I. In addition, assemble the clutch puller A (P/N:9810-10400) to the clutch puller B by tightening 2 pcs bolts A, and tighten the center bolt A. (fig.5)

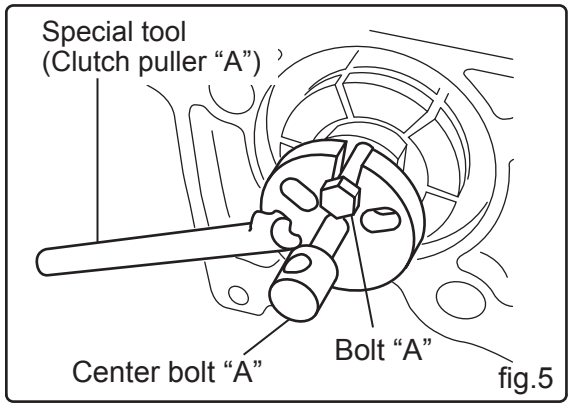


fig.5

J. Remove the clutch by shocking the top end of center bolt A with plastic hammer. (fig.6)
If it doesn’t remove, shock it after tightening the center bolt A again.

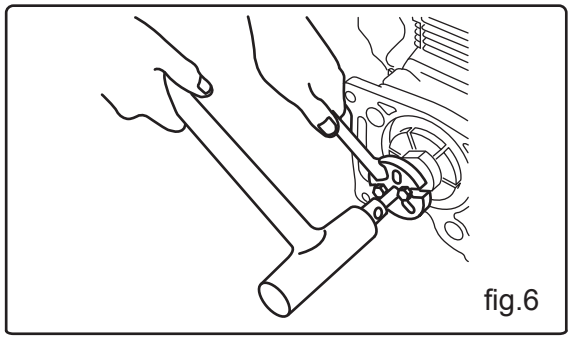


fig.6

Disassembling the engine is completed above.

(2) Reassembly

Reassemble with the reversed procedure of disassembly with attention to the following terms.

A. Replace the clutch with new one, if it is damaged.

B. Degrease the engine shaft when assembling the clutch.

C. Tighten a bolt which is fixing the clutch by fixing the clutch with the clutch mounter (P/N:9830-10060). (fig.7)

No.	Size	Tightening torque	Remarks
25	Bolt M8X25	32.4N・m (23.9ft・lbf)	Apply Loctite #221

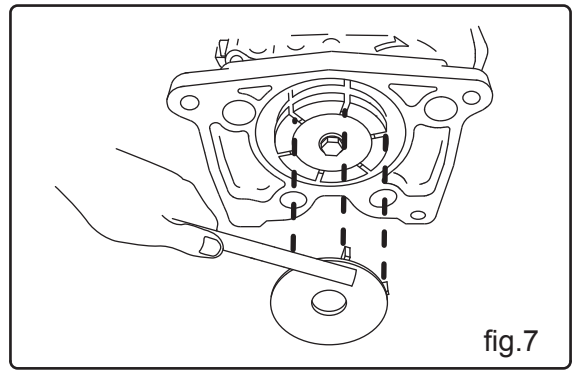


fig.7

D. Adjust the operating speed of engine as table 1.

E. The well nut (53, 59) is tightened by compressing the rubber of it when is tightening the bolt. (fig.8)

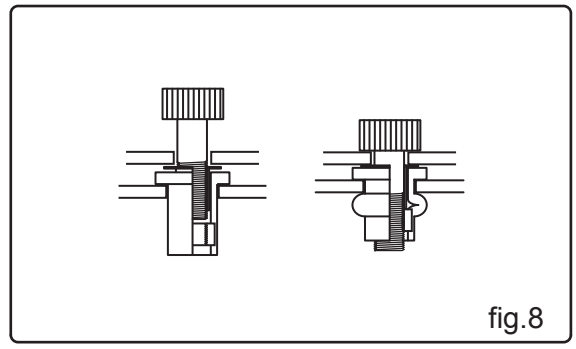


fig.8

8.2 Disassembly and reassembly the guide cylinder and the spring cylinder.

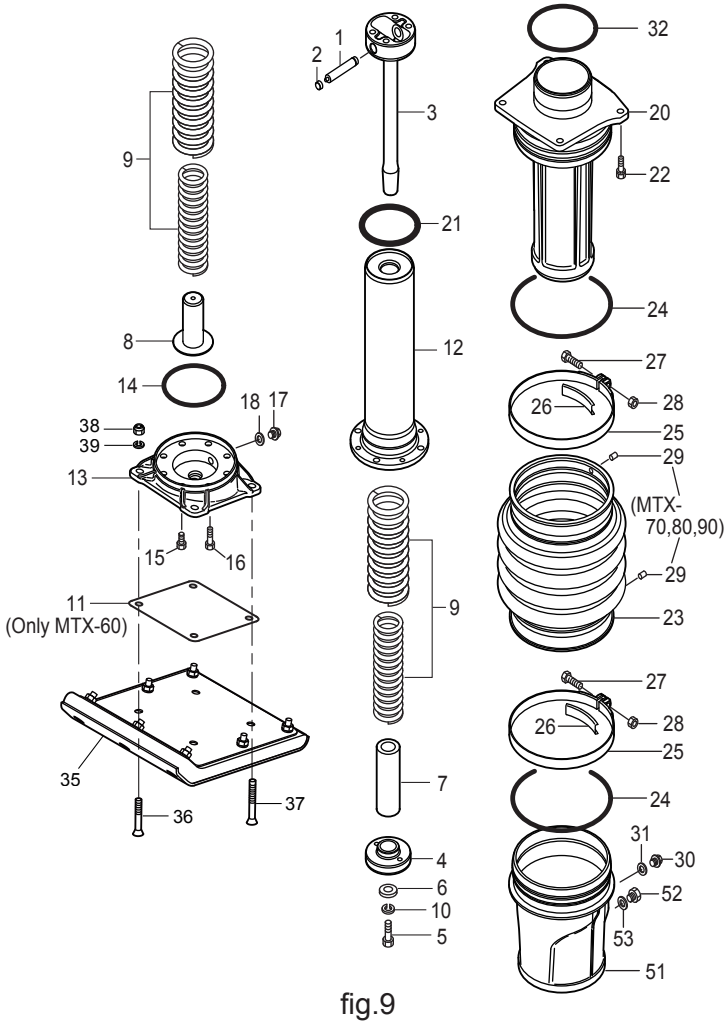


fig.9

(1) Disassembly

A. Unscrew 4 pcs bolts (22) which is fixing the crankcase and the guide cylinder.

No.	Size	Tightening torque	Remarks
22	Bolt M10X35, SW	53.9N•m (39.8ft•lbf)	Apply Loctite #221

B. Lift the crankcase and separate the connecting rod and the piston rod by removing the piston pin (1). (fig.10)

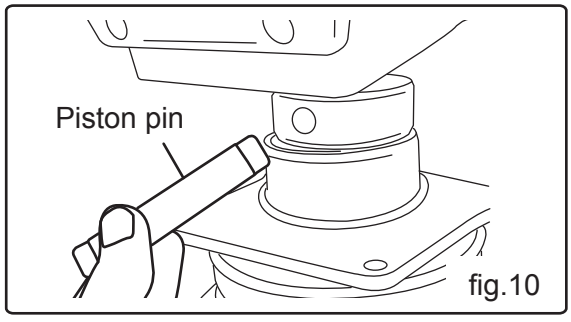


fig.10

C. Drain oil from drain plug (17).

No.	Size	Tightening torque	Remarks
17	Oil Drain Plug	39.2N•m (28.9ft•lbf)	
30	Oil Fill Plug	39.2N•m (28.9ft•lbf)	

D. Remove the guide cylinder (20) by removing a clamp (25) for the upper bellows (25) after removing the nut (28), bolt (27) and pin (29), which fixing it.
(There is no pin (29) on the MTX-60.)

No.	Size	Tightening torque	Remarks
27	Bolt M8X40	12.7N•m (9.4ft•lbf)	
28	Nut M8	12.7N•m (9.4ft•lbf)	

E. Remove the bellows (23) by removing a clamp (25) for the lower bellows after removing the nut (28), bolt (27) and pin (29), which fixing it.
(There is no pin (29) on the MTX-60.)

No.	Size	Tightening torque	Remarks
27	Bolt M8X40	12.7N•m (9.4ft•lbf)	
28	Nut M8	12.7N•m (9.4ft•lbf)	

F. Remove the foot assembly by unscrewing 4 pcs M12 nylon nuts. (fig.11)

No.	Size	Tightening torque	Remarks
38	Nylon Nut M12	78.4N•m (57.8ft•lbf)	

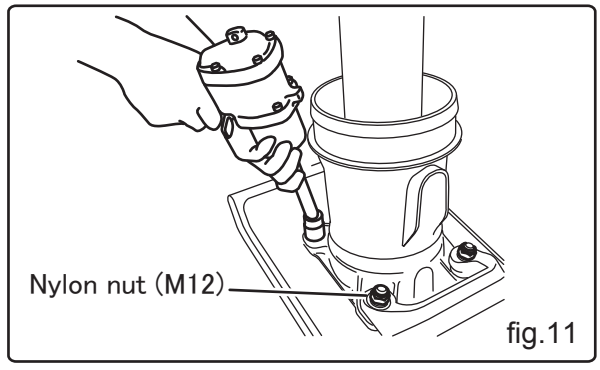


fig.11

G. Remove the foot plate from the protection sleeve (51) as per following procedure.
i) In case of MTX-60
1) Unscrew 2 pcs bolts which marked foot plate. (fig.12)
Assemble the spring cylinder remover(P/N: 9830-10040) there.Then, unscrew 6 pcs remaining bolts after tightening the center bolt of the spring cylinder remover.

No.	Size	Tightening torque	Remarks
15	Socket Head Bolt M10X20	68.6N•m (50.6ft•lbf)	Apply Loctite #221
16	Socket Head Bolt M8X40	24.5N•m (18.1ft•lbf)	Apply Loctite #221

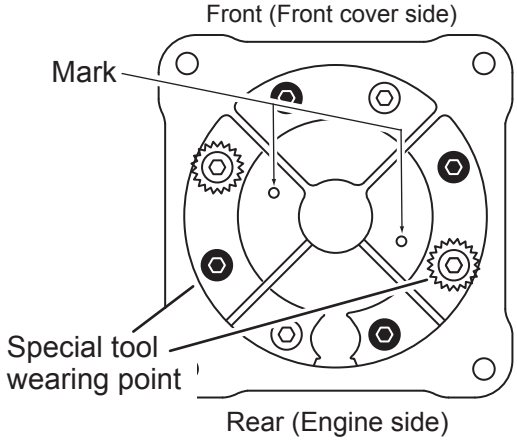
i) In case of MTX-70 / 80 / 90

1) Unscrew 2 pcs bolts which marked foot plate. (fig.12)
Assemble the spring cylinder remover(P/N: 9830-10040) there.Then, unscrew 6 pcs remaining bolts after tightening the center bolt of the spring cylinder remover.

No.	Size	Tightening torque	Remarks
15	Socket Head Bolt M10X20	68.6N·m (50.6ft·lbf)	Apply Loctite #221
16	Socket Head Bolt M10X40	53.9N·m (39.8ft·lbf)	Apply Loctite #221

MTX-60

Backside of "Foot plate"


Front (Front cover side)
Mark
Special tool wearing point
Rear (Engine side)
Socket head bolt M10 x 20(15)
Socket head bolt M 8 x 40(16)

MTX-70 / 80 / 90

Backside of "Foot plate"

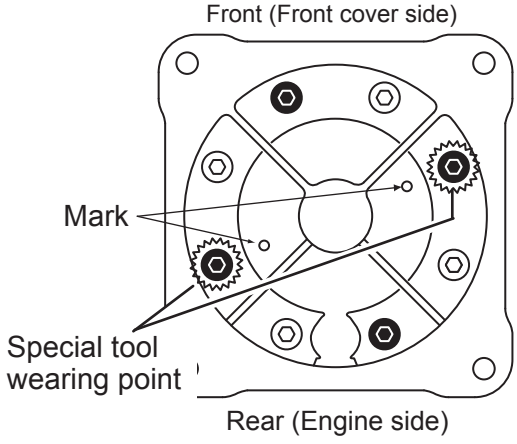

Front (Front cover side)
Mark
Special tool wearing point
Rear (Engine side)
Socket head bolt M10 x 20(15)
Socket head bolt M10 x 40(16)

fig.12

2) Loosening the center bolt of the spring cyl inder remover slowly will remove the foot plate (13). (fig.13)
Remove the spring cylinder remover when decreasing pressure of main springs (9). Then, remove the lower main springs (9) and lower stopper (8).

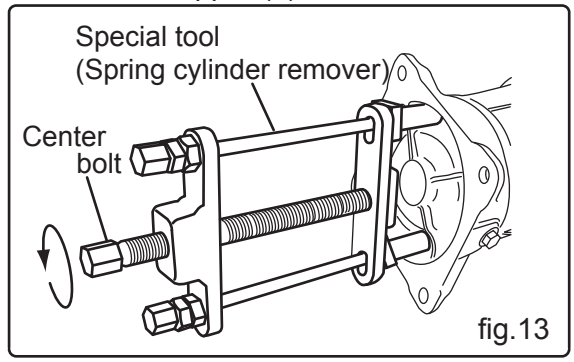


fig.13

H. Load the piston rod holder (P/N:9839-10030) to the vice, and put the spring cylinder assembly which removed the foot plate upside down to it. Then, remove the bolt (5), SW and PW, which fixing the piston end (4). (fig.14)

No.	Size	Tightening torque	Remarks
5	Bolt M12X30 (Fine Pitch Thread)	117.6N·m (83.7ft·lbf)	Apply Loctite #221

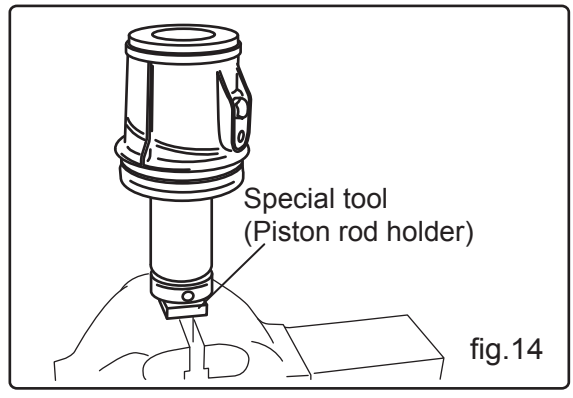


fig.14

I. Assemble the piston end remover (P/N:9839-10010) to the piston end(4), and tightening the center bolt of it. (fig.15)

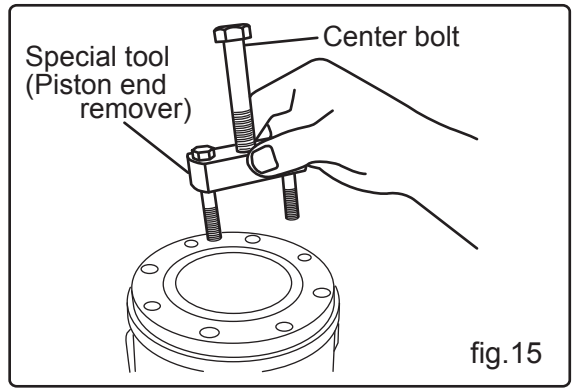


fig.15

J. Remove the piston end (4) by shocking the top end of center bolt with the plastic hammer. (fig.16)
If it doesn't remove, shock it after tightening the center bolt again.

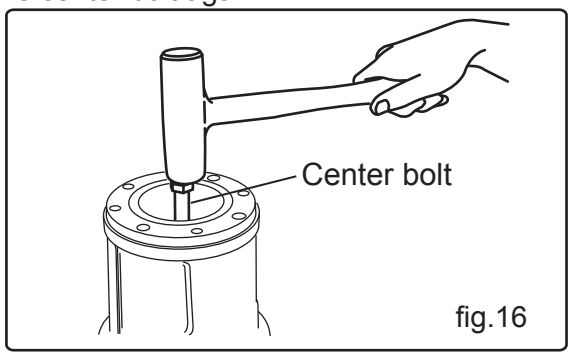


fig.16

K. Remove the protection sleeve (51) from the spring cylinder (12). (fig.17)

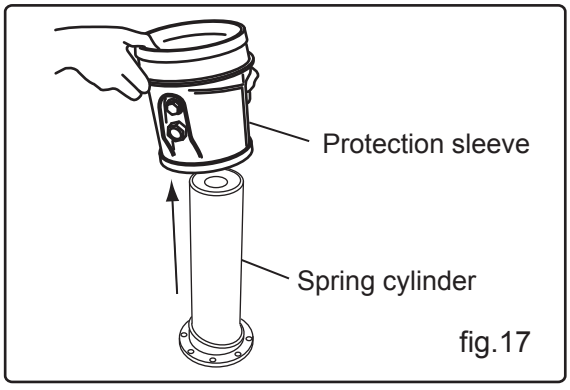


fig.17

Disassembling the guide cylinder and spring cylinder are completed above.

(2) Reassembly

Reassemble with the reversed procedure of disassembly with attention to the following terms.

A. Replace the disassembled O-ring with new one.

B. Replace the main spring (9) as a set with upper and lower when replacing it

C. Replace the bellows (23) with new one, if it is damaged.

D. The bellows (23) is easy to install by applying grease to inner wall of its opening.

E. Be careful not to pinch and to twist the O-ring when assembling the spring cylinder (12) and guide cylinder (20).

F. Apply molybdenum grease to inner sliding parts of spring cylinder (12), guide cylinder (20) and main spring (9) before assembling them.

G. Assemble the foot plate (13) to the spring cylinder (12) with the spring cylinder remover (P/N:9830-10040) after fitting position of the oil drain plug (17) of foot plate and the oil fill

8.3 Disassembly and reassembly the crankcase.

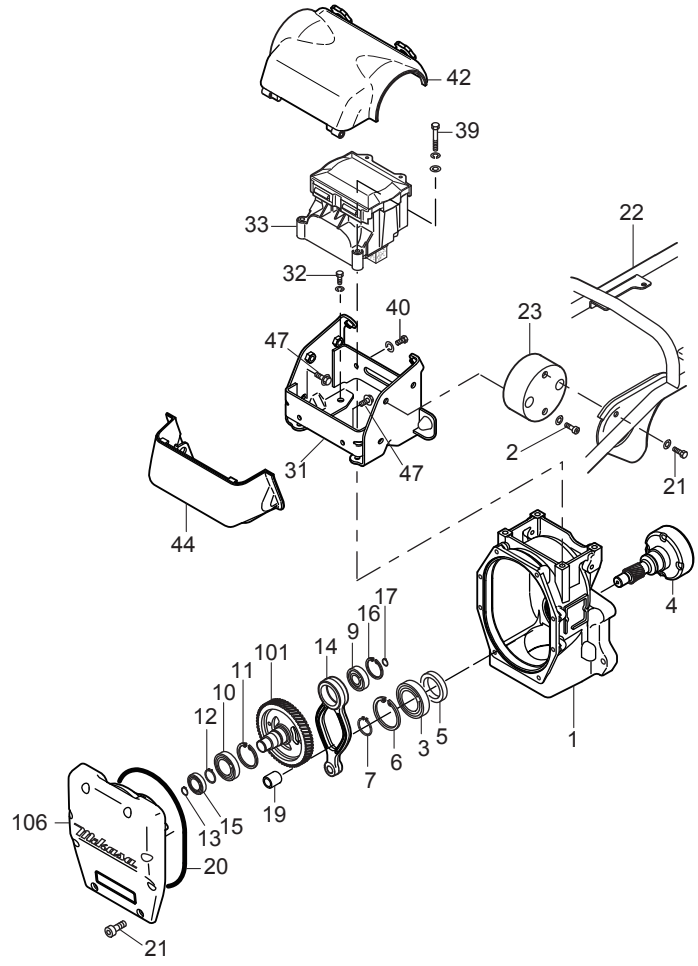


fig.18

(1) Disassembly

A. Remove the engine assembly as per 8-1.

B. Separate the crankcase and the guide cylinder as per 8-2.

C. Remove the handle assembly by unscrewing 4 pcs bolts (4) which fixing it.

D. Remove the air cleaner assembly (33) by unscrewing 2 pcs bolts (40) and 2 pcs bolts (39), which is fixing it. (fig.19)

No.	Size	Tightening torque	Remarks
39	Bolt M8X55	24.5N•m (18.1ft•lbf)	
40	Bolt M8X15	24.5N•m (18.1ft•lbf)	

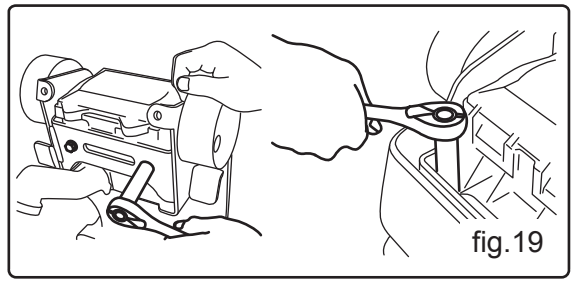


fig.19

E. Remove the shock absorber bracket (31) by unscrewing 4 pcs bolts (32) which fixing it. (fig.20)

No.	Size	Tightening torque	Remarks
32	Bolt M10X30,SW	53.9N•m (39.8ft•lbf)	Apply Loctite #221

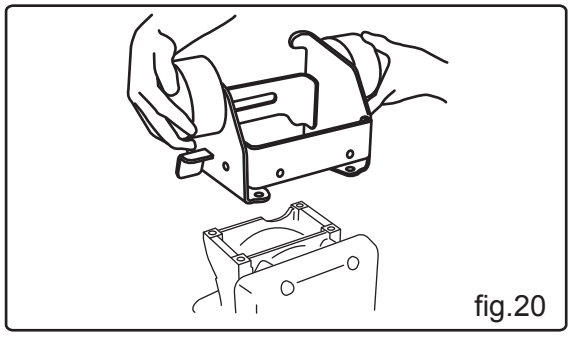


fig.20

F. Remove the front cover (106) by shocking it with the plastic hammer after unscrewing 8 pcs bolts (21) which fixing it. (fig.21)

No.	Size	Tightening torque	Remarks
21	Socket Head Bolt M8X25	24.5N•m (18.1ft•lbf)	Apply Loctite #242

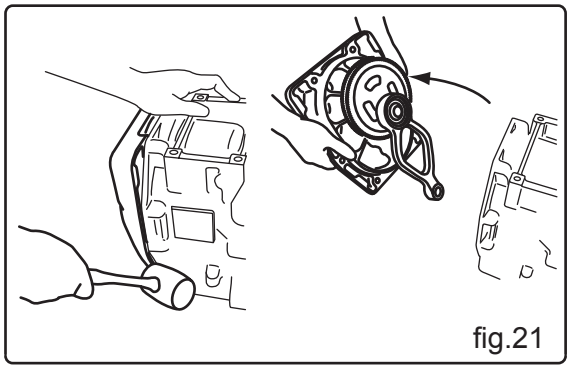


fig.21

G. Remove the stop ring (11) which fixing bearing (10) through the hole of crank gear (101) with the snap ring plier. (fig.22)

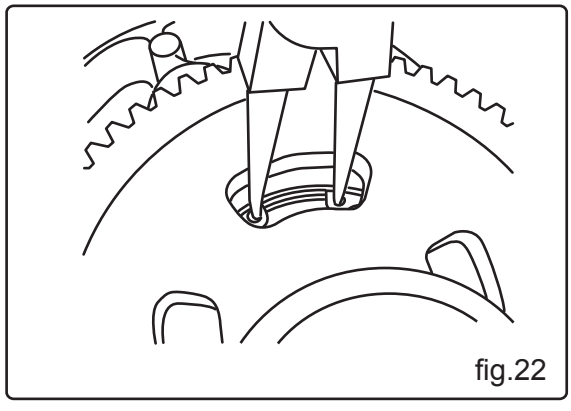


fig.22

H. Remove the crank gear by tightening 2 pcs M8x50 full threaded bolts (P/N:0091-10044) to threaded holes which installed in the crank gear evenly, after fitting position of the top end of bolts and the ribs of front cover which had three o'clock and nine o'clock positions. (fig.23)

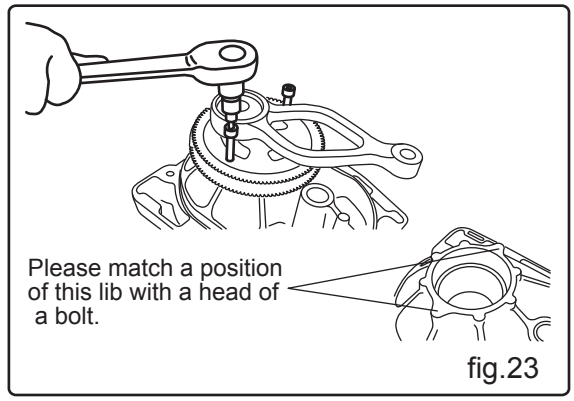


fig.23

I. Remove the connecting rod (14) from crank gear (101) with the pulley puller after removing the stop ring (17).

J. Remove the bearing (9) from the connecting rod with the press after removing the stop ring (16). (fig.24)

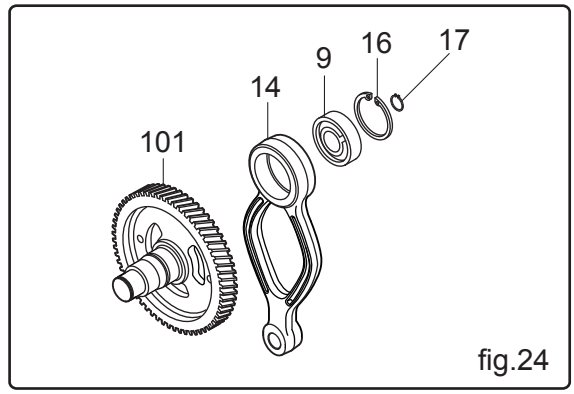


fig.24

K. Remove the pinion drum (4) from the crank case (1) with the press after removing the stop ring (7). (fig.25)

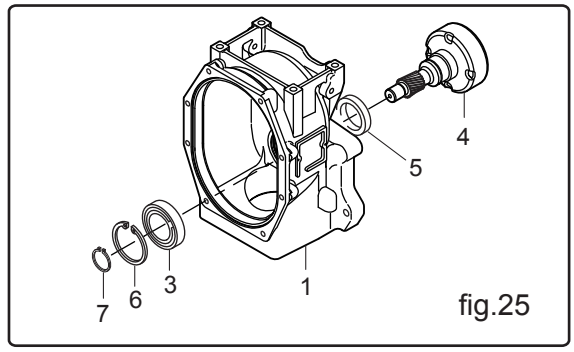


fig.25

Disassembling the crank case is completed above.

(2) Reassembly

Reassemble with the reversed procedure of disassembly with attention to the following terms.

A. Be careful not to pinch fingers between the crank case and the front cover.

B. Apply molybdenum grease to contact surface of oil seal, O-ring, tooth face of pinion gear and crank gear.

8.4 Disassembly and reassembly the handle.

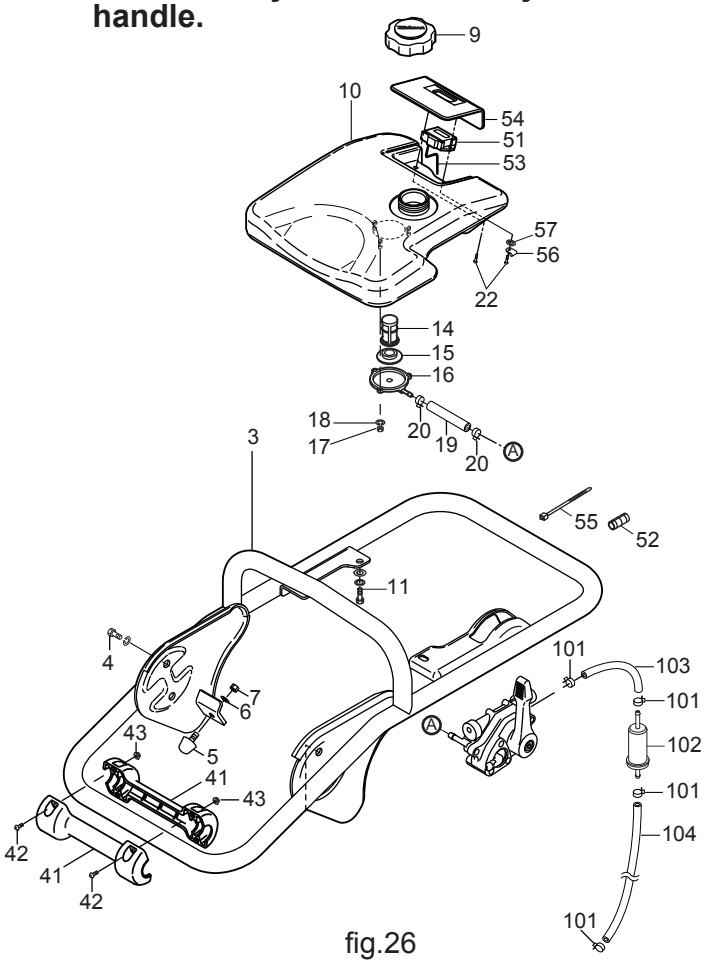


fig.26

(1) Disassembly

A. Remove the fuel tank (10) from the handle by unscrewing 3 pcs bolts (11) after disconnecting the fuel hose (19).

B. Unscrew 2 pcs tapping screws (22) which fixing the meter finisher from the underside of the fuel tank, and remove the hour & tachometer and the meter finisher at the same time because they are tightening at the same time.

C. In case of replacing the fuel filter (14) which installed in the fuel tank, remove the fuel filter holder (16) by unscrewing 3 pcs nuts (17) which is fixing it.

(2) Reassembly

Reassemble with the reversed procedure of disassembly with attention to the following terms.

A Replace the damaged fuel hoses (19, 103, 104) with new one.

B. Be careful not too tightening the tapping screws (22) which is fixing the hour & tachometer and the meter finisher because the threaded holes of the meter finisher made by plastic is broken by over tightening torque.

8.5 Disassembly and reassembly the combination lever

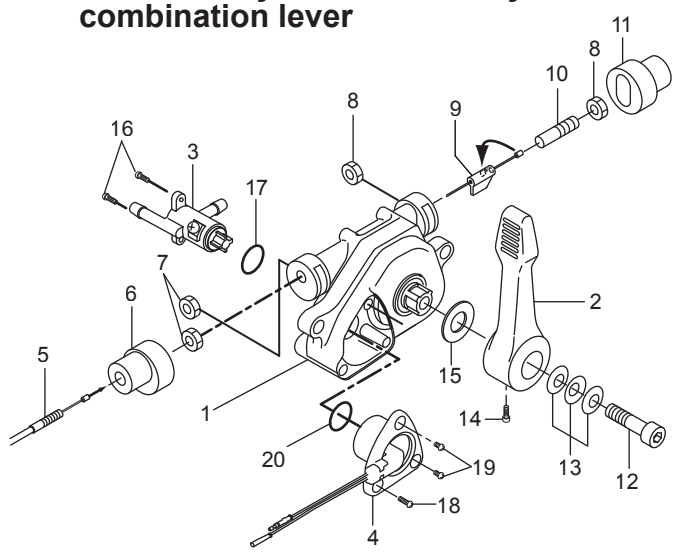


fig.27

5-1 Disassembly and reassembly the throttle wire

(1) Disassembly

A. In case of removing the throttle wire (5), move to idling position of the lever (2) ready. (fig.28)

B. Remove the end cap (11) and unscrew a bolt (10) and 2 pcs nuts (8).

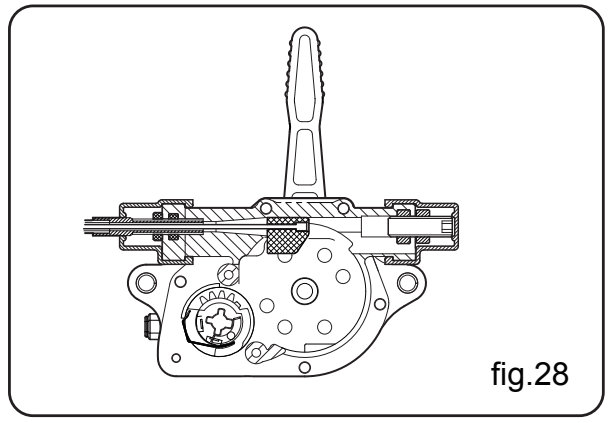


fig.28

C. Remove the slider (9) and the inner wire from there.

D. Remove the outer wire by unscrewing 2 pcs nuts (7) after removing the wire cap (6).

(2) Reassembly

Reassemble with the reversed procedure of disassembly.

5-2 Disassembly and reassembly the fuel cock

(1) Disassembly

A. In case of removing the fuel cock (3), move to high speed position of the lever (2) ready. (fig.29)

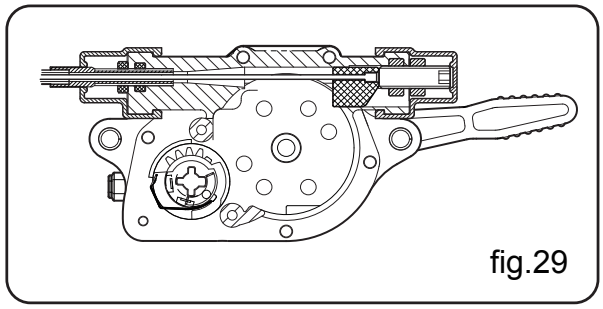


fig.29

B. Remove the fuel cock (3) by unscrewing 2 pcs tapping screw (16). (fig.30)

No.	Size	Tightening torque	Remarks
16	Tapping Screw M4X12	0.78N•m (0.58ft•lbf)	

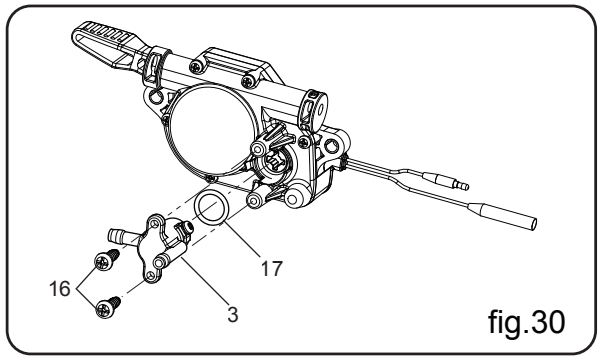


fig.30

(2) Reassembly

Reassemble with the reversed procedure of disassembly with attention to the following terms.

A. Assemble the fuel cock after fitting the position of groove between the fuel cock and the stop switch.

B. Apply grease for combination lever (P/N:9800 -10420) to the O-ring (17) and the groove of the fuel cock.

C. In case of the threaded hole was broken by too over screwing the tapping screw M4X12 (16), it is available by M14X16.

5-3 Disassembly and reassembly the stop switch

(1) Disassembly

A. In case of removing the stop switch (4), move to high speed position of the lever (2) ready. (fig.29)

B. Remove the stop switch (4) by unscrewing 2 pcs tapping screws (19) and a tapping screw (18). (fig.31)

No.	Size	Tightening torque	Remarks
18	Tapping Screw M4X30	0.78N•m (0.58ft•lbf)	
19	Tapping Screw M4X12	0.78N•m (0.58ft•lbf)	

⚠ CAUTION

Never disassemble the stop switch (4).

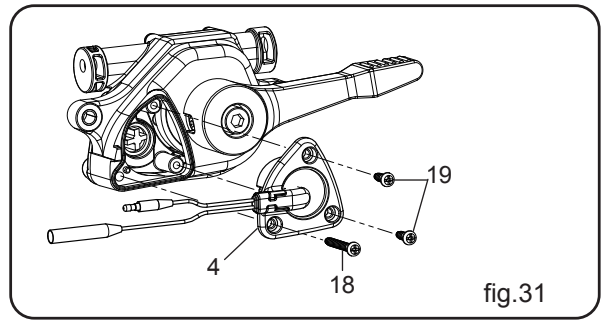


fig.31

(1) Reassemble

Reassemble with the reversed procedure of disassembly with attention to the following terms.

A. Assemble the stop switch after fitting the position of groove between the fuel cock and the stop switch.

B. Apply grease for combination lever (P/N:9800 -10420) to the O-ring (19), the groove and the gear of the stop switch.

C. In case of the threaded hole was broken by too over screwing the tapping screw M4X12 (18), it is available by M4X16.

D. In case of the threaded hole was broken by too over screwing the tapping screw M4X30 (19), it is available by M4X34.

5-4 Disassembly and reassembly the lever

(1) Disassembly

Remove the lever (2) by unscrewing a bolt (12) after unscrewing a bolt (14). (fig.32)

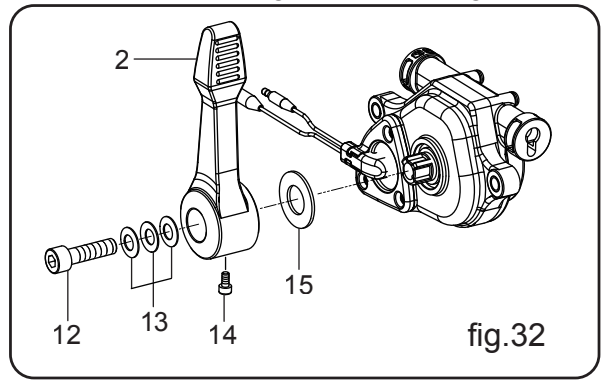


fig.32

(2) Reassembly

Reassemble with the reversed procedure of disassembly with attention to the following terms.

A. Be careful the way of dick springs as per fig.33 when assembling the lever.

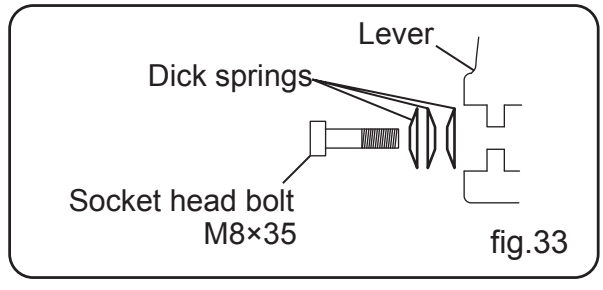


fig.33

9. PERIODIC CHECKS AND ADJUSTMENTS

9.1 Table of scheduled checks

Table 3

How often?	Place to check	Item to check	Oil etc.
Daily (before starting operation)	Appearance	Flaws, deformity, dirt	
	Air cleaner	Dirt, flaws, deformation	
	Bolts, nuts	Loose or missing parts	
	Handle	Flaws, deformity, cracks, damage	
	Rubber damper	Wear, deformity, cracks, damage	
	Engine oil	Dirt, oil level	Engine oil
	Lubrication oil in the main body	Dirt, oil level	Engine oil
	Fuel tank	Leaks, fuel level, dirt	Gasoline
	Fuel system	Leaks, wear, looseness	
After first 20 hours	Engine oil	Replace once, after the first 20 hours	Engine oil
Every 50 hours	Spark plug	Clean, adjust gap	
	Engine oil	Replace	Engine oil
Every 200 hours	Lubrication oil in the main body	Replace	Engine oil
Every 200 to 300 hours	Pre-air cleaner (primary element)	Cleaning	Lamp kerosene
Every 2 years	Fuel hose	Replace	

9.2 Periodic checks and adjustments

(1) **Daily maintenance**
Carefully wipe off any mud, dirt or oil from each component.
If oil leaks, retighten the joints and check again.

(2) **Maintenance after every 50 hours of operation**
Remove the fuel filter cup and clean the inside thoroughly. (fig.34)
Remove the spark plug and clean it. Then adjust the gap to 0.6 to 0.7 mm.

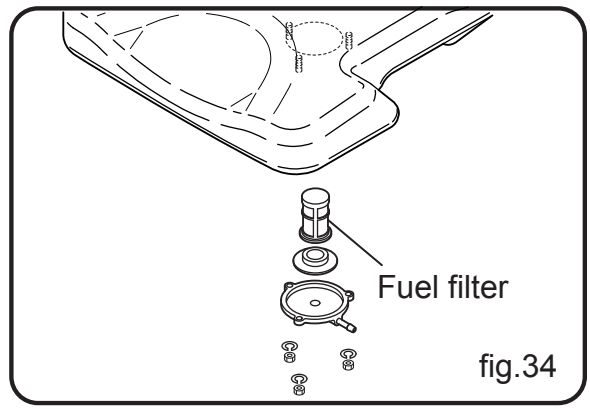


fig.34

(3) **Replacing the lubrication oil**
Remove the drain plug on the lower part of the machine body and drain the oil inside. Then add the specified amount of new oil.(fig.35)

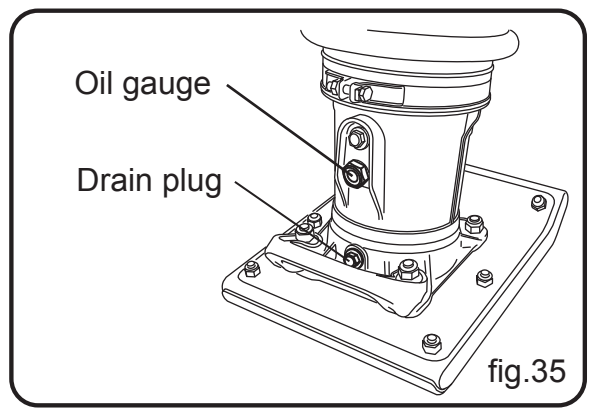


fig.35

(4) **Cleaning the air cleaner**
Remove the upper air cleaner cover on the main body. Loosen and remove the 2 Phillips screws that hold the cover on the air cleaner assembly.

A. **Primary element (clean every 80 to 100 hours)**
If the primary element is dirty, wash it with gasoline or lamp kerosene. Then, dip it in engine oil SAE10W-30 and wring it out. (Wring the element so that 25 to 30 cc of engine oil remains in the element.) (fig.36)

B. **Secondary element (clean every 100 to 150 hours)**
When the secondary element (under the primary element) becomes dirty, wash it with neutral detergent solution and dry it well. Then reuse it. (fig.37,38)

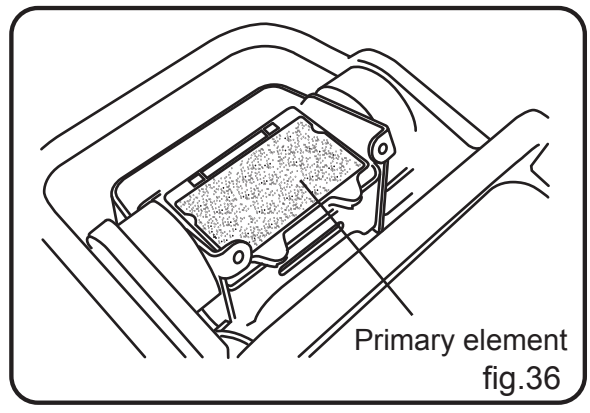


fig.36

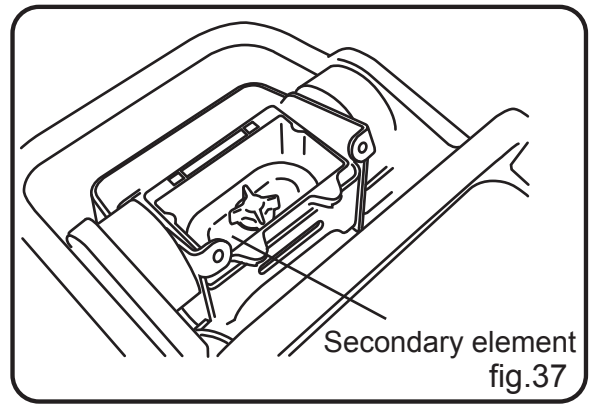


fig.37

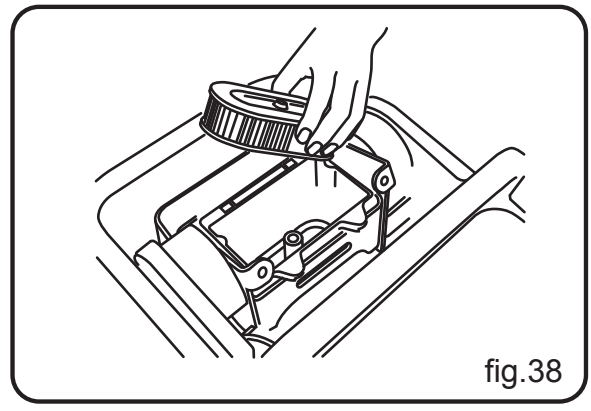


fig.38

(5) **Be sure to check the fuel line for damaged or looseness.**
Replace the fuel line every 2 years, even if it does not show any abnormality.

(6) **Cleaning the machine body**
If you want to clean the machine body using high-pressure steam, do not spray water directly into the air cleaner, carburetor, muffler, or top of the fuel tank. Otherwise engine problems may occur.

10. TROUBLESHOOTING

Engine

1.Won't start

Fuel is present but the spark plug is not sparking.	Electricity is being supplied to the high voltage cable.	The gap in the spark plug tip is clogged. Carbon is stuck on the spark plug The spark plug has a short circuit due to faulty insulation. The gap in the spark plug is the wrong size.
	Electricity is not being supplied to the high voltage cable	The stop button switch has a short circuit. The ignition coil is broken.
Fuel and spark are both present.	Compression is good	The muffler is clogged with carbon. The wrong fuel was used. The air cleaner is clogged. The fuel is contaminated with water or dirt. The cylinder head gasket is blown or the head is not
	Compression is low	correctly tightened. The piston rings don't fit well. The cylinder is worn. The spark plug is not seated tightly. The valve seat is damaged.
Fuel is not being supplied to the carburetor.	No fuel in the fuel tank. Faulty fuel cock operation. The fuel filter is clogged. The air hole in the cap on the fuel tank is clogged. Air is trapped in the fuel line.	

2.Faulty operation

Too little power	Good compression and no misfiring		Dirt in the air cleaner. Air trapped in the fuel line. Carbon has accumulated in the cylinder.
	Low compression (See ”Compression in low” above		
	Good compression but misfires		Faulty ignition coil. Dirt on the spark plug. Ignition coil shorts sometimes.
Engine overheats	Excessive accumulation of carbon in the combustion chamber. Clog exhaust port or muffler. Faulty spark plug.		
Smoke comes from the muffler	Black smoke		Choke lever wasn't returned to the open position.
	Blue smoke	Good compression	Blended fuel (for 2-cycle engines) was used. Too much oil. Engine oil leaked into the air cleaner when the machine was laid down on the wrong side.
		Compression is low	Worn piston rings. The piston rings don't fit well.
	White smoke		Moisture in the gasoline. The air cleaner is wet.

(In the winter, the machine may emit white smoke for a while when first started in the morning. This is not abnormal.)

Engine speed fluctuates	Faulty governor adjustment. Faulty governor spring. Faulty fuel flow. Air being sucked into the fuel line.

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